

THE INVENTION CLAIMED IS:

1. An apparatus for opening a substrate carrier comprising:

5 a substrate transfer location having a support adapted to support a substrate carrier and an actuator mechanism positioned relative to the support so as to interact with an opening mechanism of a substrate carrier supported by the support;

10 wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier so as to employ a movement of the substrate carrier to actuate opening of the substrate carrier.

15 2. The apparatus of claim 1, wherein the support is a docking platform, and wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier so as to employ a docking movement of the substrate carrier to actuate opening of the substrate carrier.

20 3. The apparatus of claim 2, wherein the substrate transfer location includes a port through which a substrate is transferred.

25 4. The apparatus of claim 1, further comprising at least one substrate carrier storage shelf associated with the substrate transfer location.

30 5. The apparatus of claim 4, wherein the at least one storage shelf is located vertically above the substrate transfer location.

35 6. The apparatus of claim 1, wherein the substrate transfer location includes a tunnel adapted to

direct a laminar air flow past a substrate carrier docked at the substrate transfer location.

7. The apparatus of claim 1, wherein the
5 actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier so as to employ a second movement of the substrate carrier to actuate closing of the substrate carrier.

10 8. The apparatus of claim 1, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier via a cam follower arrangement.

15 9. The apparatus of claim 8, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier via a magnetic cam follower arrangement.

20 10. The apparatus of claim 1, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier to pivot a door of the substrate carrier.

25 11. The apparatus of claim 10, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier to pivot the door downwardly.

30 12. The apparatus of claim 10, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier to pivot a pair of doors of the substrate carrier in opposite directions.

13. The apparatus of claim 1, wherein the actuator mechanism is adapted to unlatch an openable portion of the substrate carrier.

5 14. The apparatus of claim 13, wherein the actuator mechanism is adapted to unclamp a substrate contained in the substrate carrier.

10 15. The apparatus of claim 1, wherein the actuator mechanism is adapted to unclamp a substrate contained in the substrate carrier.

15 16. The apparatus of claim 1, wherein the support is a docking platform and the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier so as to employ a docking movement of the substrate carrier to actuate opening of the substrate carrier; and wherein the apparatus further comprises a sensor adapted to sense a condition indicative of air flow directed so as to
20 flow laminarly past a substrate carrier positioned on the docking platform.

25 17. The apparatus of claim 16, further comprising a controller coupled to the sensor and the docking platform and adapted to move the docking platform so as to close a substrate carrier supported thereon if the sensor detects loss of the laminar air flow.

30 18. The apparatus of claim 1, wherein the movement of the substrate carrier employed to actuate opening of the substrate carrier is a movement toward a processing tool associated with the substrate transfer location.

19. The apparatus of claim 1, wherein the substrate transfer location includes a port through which a substrate is transferred.

5 20. A substrate carrier comprising:

 a substrate carrier housing having an openable portion and an opening mechanism coupled to the openable portion adapted so as to interface with an actuator mechanism located at a substrate transfer location so as to
10 employ movement of the substrate carrier to actuate opening and closing of the substrate carrier.

 21. The substrate carrier of claim 20, wherein the opening mechanism is adapted to interface with the
15 actuator mechanism located at the substrate transfer location via a cam follower arrangement.

 22. The substrate carrier of claim 21, wherein the substrate transfer location includes a port through
20 which a substrate is transferred.

 23. The substrate carrier of claim 20, wherein the openable portion includes a door that is pivotably mounted on the substrate carrier housing and is adapted to
25 be pivoted by the opening mechanism.

 24. The substrate carrier of claim 23, wherein the opening mechanism pivots the door downwardly to open the substrate carrier.

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 25. The substrate carrier of claim 23, wherein the openable portion includes a pair of doors pivotably mounted on the substrate carrier housing and adapted to be pivoted in opposite directions by the opening mechanism to
35 open the substrate carrier.

26. The substrate carrier of claim 20, further comprising a latching mechanism adapted to interface with a latching actuator mechanism located at the substrate transfer location so as to employ movement of the substrate carrier to selectively latch and unlatch the openable portion of the substrate carrier as the substrate carrier moves toward and away from the transfer location.

27. The substrate carrier of claim 26, further comprising a clamping mechanism adapted to interface with a clamping actuator mechanism located at the substrate transfer location so as to employ movement of the substrate carrier to selectively clamp and unclamp a substrate contained in the substrate carrier as the substrate carrier moves toward and away from the transfer location.

28. The substrate carrier of claim 20, further comprising a clamping mechanism adapted to interface with a clamping actuator mechanism located at the substrate transfer location so as to employ movement of the substrate carrier to selectively clamp and unclamp a substrate contained in the substrate carrier as the substrate carrier moves toward and away from the transfer location.

29. The substrate carrier of claim 20, wherein the housing is adapted to house only a single substrate.

30. The substrate carrier of claim 20, wherein the openable portion is hingedly secured to the substrate carrier housing.

31. A system for opening a substrate carrier, comprising:

a substrate carrier having an openable portion, and having an opening mechanism coupled to the openable portion; and

a substrate transfer location having a support adapted to support the substrate carrier, and an actuator mechanism positioned relative to the support so as to interact with the opening mechanism coupled to the openable portion of the substrate carrier;

wherein the actuator mechanism of the substrate transfer location and the opening mechanism of the substrate carrier are adapted to interface with each other so as to employ movement of the substrate carrier to achieve opening and closing of the substrate carrier.

32. The system of claim 31, wherein the substrate transfer location further comprises a port through which substrates may be transferred.

33. The system of claim 32, wherein the support is a docking platform, and wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier so as to employ a docking movement of the substrate carrier to actuate opening of the substrate carrier.

34. The system of claim 31, further comprising a load lock to which the transfer location is coupled.

35. The system of claim 34, wherein the support is a docking platform, and wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier so as to employ a docking movement of the substrate carrier to actuate opening of the substrate carrier.

36. The system of claim 31, further comprising at least one substrate carrier storage shelf associated with the substrate transfer location.

5 37. The system of claim 36, wherein the at least one storage shelf is located vertically above the substrate transfer location.

10 38. The system of claim 31, wherein the substrate transfer location includes a tunnel adapted to direct a laminar air flow past a substrate carrier positioned at the substrate transfer location.

15 39. The system of claim 31, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier via a cam follower arrangement.

20 40. The system of claim 39, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier via a magnetic cam follower arrangement.

25 41. The system of claim 31, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier to pivot a door of the substrate carrier.

30 42. The system of claim 41, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier to pivot the door downwardly.

35 43. The system of claim 41, wherein the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier to pivot a pair of doors of the substrate carrier in opposite directions.

44. The system of claim 31, wherein the actuator mechanism is adapted to employ movement of the substrate carrier to unlatch an openable portion of the substrate carrier.

45. The system of claim 44, wherein the actuator mechanism is adapted to employ movement of the substrate carrier to unclamp a substrate contained in the substrate carrier.

46. The system of claim 31, wherein the actuator mechanism is adapted to employ movement of the substrate carrier to unclamp a substrate contained in the substrate carrier.

47. The system of claim 31, wherein the support is a docking mechanism and the actuator mechanism is adapted to interface with the opening mechanism of the substrate carrier so as to employ a docking movement of the substrate carrier to actuate opening of the substrate carrier; and wherein the system further comprises a sensor adapted to sense a condition indicative of air flow directed so as to flow laminarly past a substrate carrier supported by the docking platform.

48. The system of claim 47, further comprising a controller coupled to the sensor and the docking platform and adapted to move the docking platform so as to close a substrate carrier supported thereby if the sensor detects loss of the laminar air flow.

49. The system of claim 31, wherein the movement of the substrate carrier employed to actuate opening of the

substrate carrier is a movement towards a processing tool associated with the substrate transfer location.

50. The system of claim 31, wherein the substrate transfer location includes a port through which a substrate is transferred.

51. A system for opening a substrate carrier, comprising:

10 a port adapted to have a substrate transferred therethrough;

a first mechanism adapted to move a substrate carrier toward the port; and

15 a second mechanism adapted to translate motion of the substrate carrier toward the port into a force for opening a door of the substrate carrier.

52. The system of claim 51, wherein the first mechanism includes a docking platform adapted to move a substrate carrier supported thereon toward the port.

53. The system of claim 51, wherein the second mechanism includes a cam mounted adjacent the port and a cam follower coupled to the door of the substrate carrier.

25 54. The system of claim 51, wherein the force for opening a door of the substrate carrier comprises a force for pivoting the door on a hinge mounted on the substrate carrier.

30 55. The system of claim 51, wherein the port is a port formed in a clean room wall.

35 56. The system of claim 51, wherein the port is a port of a load lock chamber.

57. A method of opening a substrate carrier,
comprising:

5 moving a substrate carrier toward a port that is
adapted to have a substrate transferred therethrough; and
translating motion of the substrate carrier toward
the port into a force for opening a door of the substrate
carrier.

10 58. The method of claim 57, wherein the moving
step comprises supporting the substrate carrier on a docking
platform and moving the docking platform toward a port.

15 59. The method of claim 57, wherein the
translating step includes contacting a cam follower coupled
to the door with a cam mounted adjacent the port.

20 60. The method of claim 57, wherein the
translating step includes exposing a magnet coupled to the
door to a magnetic field generated by a magnet mounted
adjacent the port.

25 61. The method of claim 57, wherein the opening
of the door includes pivoting the door on a hinge mounted on
the substrate carrier.

62. The method of claim 61, wherein the opening
of the door includes pivoting the door downwardly.

30 63. The method of claim 57, wherein the
translating step includes translating the motion of the
substrate carrier into respective forces for opening two
doors of the substrate carrier.

64. A method of opening a substrate carrier,
comprising:

moving a substrate carrier;

translating the motion of the substrate carrier
5 into respective forces for opening two doors of the
substrate carrier.

65. The method of claim 64, wherein the
translating step includes contacting with a cam respective
10 cam followers coupled to the doors.

66. The method of claim 65, wherein the
translating step includes exposing to a magnetic field
respective magnets coupled to the doors.